

What is claimed is:

1 1. A regenerative pump for adding energy to a  
 2 fluid comprising:  
 3 a casing having a fluid inlet and a fluid  
 4 outlet separated by a stripper, said casing having  
 5 axially spaced, radially extending first and second side  
 6 walls;  
 7 an impeller enclosed within said casing, and  
 8 said impeller having an axis of rotation and axially  
 9 spaced, radially extending first and second surfaces  
 10 facing said first and second side walls of said casing,  
 11 respectively; and  
 12 means, formed in at least one side wall of said  
 13 casing, for defining a flow path between said fluid inlet  
 14 and said fluid outlet, and said flow path defining means  
 15 having a first cross-sectional area at said fluid inlet  
 16 and a second cross-sectional area at said fluid outlet  
 17 wherein said second cross-sectional area is less than  
 18 said first cross-sectional area.

1 2. The regenerative pump as stated in claim  
 2 1, further comprising:  
 3 said flow path defining means tapering from  
 4 said first cross-sectional area of said fluid inlet to  
 5 said second cross-sectional area of said fluid outlet.

1 <sup>2</sup>  
 2 ~~3~~. The regenerative pump as stated in claim <sup>1</sup>  
 3 further comprising:  
 4 said flow path defining means tapering axially  
 5 inward toward said impeller from said fluid inlet to said  
 6 fluid outlet.

1 <sup>3</sup>  
 2 ~~4~~. The regenerative pump as stated in claim <sup>2</sup>  
 3 further comprising:

3           said flow path defining means tapering axially  
4       inward toward said impeller at a constant slope from said  
5       fluid inlet to said fluid outlet.

1           <sup>4</sup>  
2       ~~5~~. The regenerative pump as stated in claim 1,  
3       further comprising:

4           said flow path defining means formed  
5       asymmetrically in said first and second side walls of  
6       said casing around said axis of rotation for directing  
7       fluid back toward said impeller as said impeller rotates.

1           <sup>5</sup>  
2       ~~6~~. The regenerative pump as stated in claim 1,  
3       wherein said flow path defining means further comprises:  
4           at least one of said first and second side  
5       walls having a generally ring-shaped, side channel  
6       portion formed in said casing around said axis of  
7       rotation for directing fluid toward said impeller as said  
8       impeller rotates.

1           <sup>6</sup>  
2       ~~7~~. The regenerative pump as stated in claim <sup>5</sup>~~6~~,  
3       further comprising:  
4           said side channel portion generally  
5       perpendicular to and along an arc of constant radius  
6       centered on said axis of rotation.

Sub  
A2  
1           8. The regenerative pump as stated in claim  
2       1, further comprising:  
3           said second cross-sectional area at said fluid  
4       outlet being 10% to 50% less than said first cross-  
5       sectional area at said fluid inlet.

1           <sup>8</sup>  
2       ~~9~~. A regenerative pump for adding energy to a  
3       fluid comprising:  
4           a casing having a fluid inlet and a fluid  
5       outlet separated by a stripper, said casing having  
6       axially spaced, radially extending first and second side  
7       walls;

7 an impeller enclosed within said casing, and  
 8 said impeller having an axis of rotation and axially  
 9 spaced, radially extending first and second surfaces  
 10 facing said first and second side walls of said casing,  
 11 respectively; and

12 means, formed in at least one side wall of said  
 13 casing, for defining a flow path between said fluid inlet  
 14 and said fluid outlet, and said flow path defining means  
 15 tapering axially inward toward said impeller from said  
 16 fluid inlet to said fluid outlet as said fluid is  
 17 directed back toward said impeller as said impeller  
 18 rotates.

1 <sup>9</sup>  
~~8~~ 10. The regenerative pump as stated in claim  
 2 ~~9~~, further comprising:

3 said flow path defining means having a first  
 4 cross-sectional area at said fluid inlet and a second  
 5 cross-sectional area at said fluid outlet wherein said  
 6 second cross-sectional area is 25% less than said first  
 7 cross-sectional area.

1 <sup>10</sup>  
~~8~~ 11. The regenerative pump as stated in claim  
 2 ~~9~~, further comprising:

3 said flow path defining means tapering axially  
 4 inward toward said impeller at a constant slope from said  
 5 fluid inlet to said fluid outlet.

1 <sup>11</sup>  
~~8~~ 12. The regenerative pump as stated in claim  
 2 ~~9~~, further comprising:

3 said flow path defining means formed  
 4 asymmetrically in said first and second side walls of  
 5 said casing around said axis of rotation for directing  
 6 fluid back toward said impeller as said impeller rotates.

1 <sup>12</sup>  
~~8~~ 13. The regenerative pump as stated in claim  
 2 ~~9~~, wherein said flow path defining means further  
 3 comprises:

4 at least one of said first and second side  
 5 walls having a generally ring-shaped, side channel  
 6 portion formed in said casing around said axis of  
 7 rotation for directing fluid toward said impeller as said  
 8 impeller rotates.

1 <sup>13</sup>  
 2 ~~13~~, further comprising:  
 3 said side channel portion generally  
 4 perpendicular to and along an arc of constant radius  
 5 centered on said axis of rotation.

1 15. A regenerative pump for adding energy to a  
 2 fluid comprising:  
 3 an impeller having an axis of rotation and  
 4 axially spaced, radially extending first and second  
 5 surfaces;  
 6 a casing enclosing the impeller and having a  
 7 fluid inlet and a fluid outlet separated by a stripper,  
 8 the casing having axially spaced, radially extending  
 9 first and second side walls, said first and second side  
 10 walls facing said first and second surfaces of said  
 11 impeller, respectively;  
 12 axially and radially extending blade means  
 13 formed on an outer radial periphery of said impeller for  
 14 driving fluid from said inlet toward said outlet as said  
 15 impeller rotates about said axis of rotation; and  
 16 a generally ring shaped side channel portion  
 17 formed in at least one of said first and second side  
 18 walls of said casing for defining a flow path between  
 19 said fluid inlet and said fluid outlet, and said side  
 20 channel portion tapering axially inward toward said  
 21 impeller from said fluid inlet to said fluid outlet for  
 22 directing fluid back into contact with said blade means  
 23 as said impeller rotates.

00430320 11200

Sub  
a3

1                   <sup>15</sup>  
                   ~~16~~. The regenerative pump as stated in claim  
 2       <sup>14</sup>  
       ~~15~~, further comprising:  
 3                   said side channel portion tapering axially  
 4       inward toward said impeller at a constant slope from said  
 5       fluid inlet to said fluid outlet.

1                   <sup>16</sup>  
                   ~~17~~. The regenerative pump as stated in claim  
 2       <sup>14</sup>  
       ~~15~~, further comprising:  
 3                   said side channel portion formed asymmetrically  
 4       in said first and second side walls of said casing around  
 5       said axis of rotation for directing fluid back into  
 6       contact with said blade means as said impeller rotates.

1                   <sup>17</sup>  
                   ~~18~~. The regenerative pump as stated in claim  
 2       <sup>14</sup>  
       ~~15~~, further comprising:  
 3                   said side channel portion generally  
 4       perpendicular to and along an arc of constant radius and  
 5       centered on said axis of rotation.

1                   <sup>18</sup>  
                   ~~19~~. The regenerative pump as stated in claim  
 2       <sup>14</sup>  
       ~~15~~, further comprising:  
 3                   said casing radially split and including an  
 4       impeller housing and an impeller cover wherein said side  
 5       channel portion is formed in both said impeller housing  
 6       and said impeller cover.

1                   <sup>19</sup>  
                   ~~20~~. The regenerative pump as stated in claim  
 2       <sup>14</sup>  
       ~~15~~, further comprising:  
 3                   said side channel portion having a constant  
 4       radial width extending from said fluid inlet to said  
 5       fluid outlet.